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Cover Images:

Front: The Mundaring Weir under construction. It was completed in 1903. The "Golden Pipeline", taking water from near Perth to the distant goldfields at Coolgardie and Kalgoorlie in Western Australia, started at Mundaring Weir.

Photo: National Trust, courtesy of the Forrest family.

Back: Interior view of the Murtoa Stick Shed in western Victoria. Photo: Owen Peake, October 2010.

This is a free quarterly magazine covering stories and news items about industrial and engineering heritage in Australia and elsewhere. It is published online as a downloadable PDF document for readers to view on screen or print their own copies. EA members and non-members on the EHA mailing lists will receive emails notifying them of new issues, with a link to the relevant Engineers Australia website page.

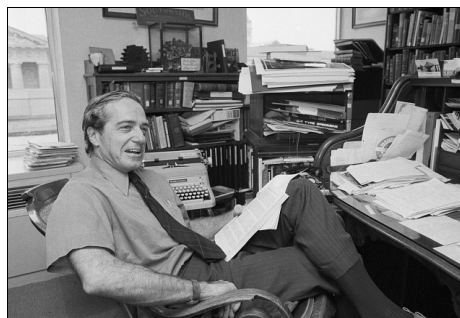
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Editorial

In Part 2 of the story about the Woolloomooloo Finger Wharf (page 18 in this issue of the magazine) I mentioned that I – actually Carl & I – were planning a trip to the United States to study various aspects of industrial archaeology, conservation planning, Main Street revitalising programs, recycling projects, and historic port redevelopments. In the meantime, I had written to a number of professional acquaintances in the US to tee up meetings and site visits, including the Chief Historical Architect of the US National Parks Service, the developer of the US Main Streets program, the International Affairs Director of ASME (American Society of Mechanical Engineers) and the Chief of the Historic American Engineering Record (HAER) in the Dept of the Interior, all of whom put Robert M. Vogel of the Smithsonian Institution (now the National Museum of American History) in Washington DC on top of their lists of useful contacts. Obviously a Must Not Miss! And we didn't.



Robert Vogel at his desk at the Smithsonian in 1977
Library of Congress. online catalogue.

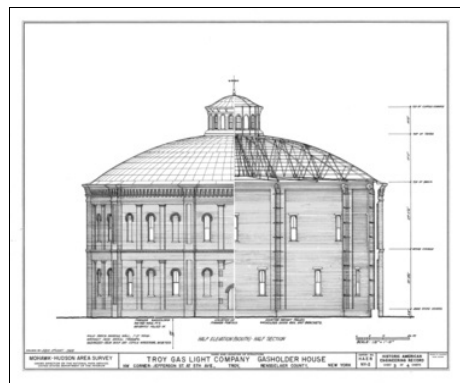
We flew from Sydney to Washington DC on one day, and visited Vogel at the Smithsonian two days later (no time for jet lag). My (rather dry) official diary entry says: 1.00pm – Robert Vogel, Curator of Mechanical and Civil Engineering, Smithsonian Institution and Secretary of the Society for Industrial Archeology.

Discussed US projects and methods and the relative importance of Australian Industrial sites, particularly Eveleigh Railway Workshops in Sydney. Toured relevant displays in Smithsonian, with emphasis on methods of interpretation. I didn't write how he told us much about the SIA (Society for Industrial Archeology) and signed us up as members on the spot. Vogel was a leader and founder in the creation of SIA in 1971. Its goal – to promote interdisciplinary exchanges, generate publications and bibliographic resources, to educate the public and the government about the values of preservation, and study of industrial sites.¹

SLA has grown slowly but surely, with an eclectic mix of professional and avocational members numbering nearly 2000. Regular publications include a quarterly newsletter and bi-annual journal (IA, Journal of the Society for Industrial Archeology). SLA holds annual conferences, a separate set of Fall [Autumn] tours and occasional study tours . . . In recent years, several small grants have been awarded to preservation groups taking an activist role in the support of industrial heritage preservation.² We have remained members of SIA for nearly 31 years now, and it has proved to be one of our most valuable sources of international information, ideas, comparisons and intelligence in our professional work.



Robert Vogel sitting in an hydraulic elevator car [passenger lift]. Vogel was responsible for re-locating this lift from Boston to the Smithsonian. No date, but probably about the time we met.
Library of Congress. online catalogue.



This HAER drawing of a gasholder in Troy NY has long been used as the logo for SIA. Wikipedia.

The Newsletters typically contain a *Publications of Interest* section (a variant of my *Connections* page, but on steroids) which sometimes runs to 4 or more pages, and is an amazing resource, listing newsletters, magazines, journals, books, and newspaper stories covering General Interest (EHA Magazine gets a guernsey in this one), Textiles, Iron & Steel, Mines & Mining, Water Transport, Railroads, Automobiles & Highways, Agriculture & Food Processing, Buildings & Structures, Bridges, Lumber & Paper, and Power Generation. There is a section on IA ON THE WEB and, absolutely astonishing to me, a regular listing, usually running to several pages, of all the *industrial heritage and related sites added to the National Register of Historic Places (U.S.)* since the last newsletter. From July 2nd to September 30th 2016, this amounted to an extraordinary total of 45 sites added in three months!

I would be very happy to be corrected, but I think Carl and I are the only current SIA members in Australia. I thought that some of our readers might be interested to find out more about SIA, and maybe even join up themselves, so to that end I can (with permission) publish a link to Volume 45, No.4, Fall 2016 SIA Newsletter at:

http://www.sia-web.org/wordpress/wp-content/uploads/2016/12/Vol45_No4_Fall_2016.pdf

If this link doesn't work for you, ask me, and I'll email you a copy.

HAER, an arm of the US National Parks Service in the Department of the Interior, is an organisation for us to envy. It has carried out, and/or supervised, the detailed recording of numerous American industrial or engineering heritage sites over many years.



1 *International Handbook of Historical Archaeology* by Teresita Majewski & David Gaimster, page 287.

2 *ibid.*, page 289.

Keith Baker, DipEng, BE, FRMIT, M.ApSci, FIEAust, CPEng, MICOMOS awarded the 2016 Engineers Australia John Monash Medal

The Engineers Australia John Monash Medal for Heritage recognises an individual who has made, over a considerable period of time, an outstanding contribution to engineering heritage in Australia.

The Citation



Keith Baker

Photo: Engineers Australia.

Keith's passion for the conservation and interpretation of the heritage aspects of our built environment developed after arriving in Canberra in 1982, through his professional involvement over many years with the Commonwealth Government and Australian Capital Territory (ACT) Government organisations concerned with works, construction and housing.

He subsequently undertook a Master of Applied Science in Cultural Heritage Management at the University of Canberra, and worked part-time for the Australian Heritage Commission where he conducted many projects, including overseeing the National Historic Shipwrecks program and National Heritage coordination..

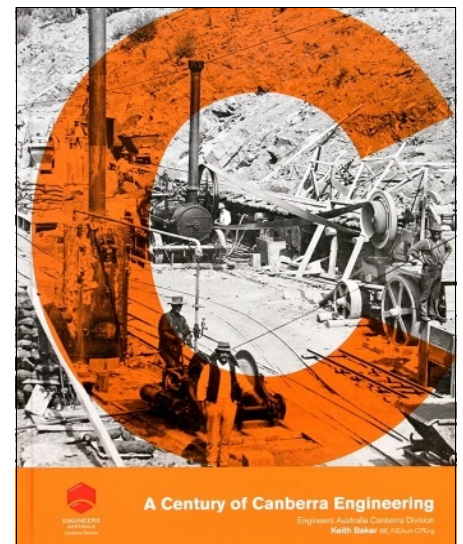
Keith then formed his own consultancy company and undertook heritage studies on subjects as varied as Canberra's street lighting, the Cotter River dam and pumping station, an interpretation of the Kingston Powerhouse, an assessment of the Canberra Main Outfall Sewer and Old Parliament House engineering services, a general heritage study of the town of Tumbarumba, and a study of the historic significance of Old Windsor Road. Much of this work has had a direct impact on both the immediate and ongoing conservation of these heritage sites, and a wider impact through published papers and reports on this diverse range of subjects.

He has been a member of Engineering Heritage Canberra since the early 1990's and served the group in several capacities,

including as its Chair. He has also been a member of the Board of Engineering Heritage Australia since 1999, serving as its Chair for two non-consecutive periods. He is a long-time member of Australia ICOMOS and the National Trust of Australia (ACT). Keith was also a member of the ACT (Government) Heritage Council's Standing Committee on Built Heritage for two years. Across these many groups and bodies, Keith always sought to promote the cause of engineering heritage and to seek opportunities to promote common interests for the benefit of our engineering heritage.

Written to coincide with the Centenary of Canberra, his book *A Centenary of Canberra Engineering*¹ has been an outstanding success in promoting Engineering Heritage within the ACT and beyond. This award winning record was written in such a way as to appeal to the general public rather than just engineers or historians, thus broadening its interest to the wider community. The book won the Colin Crisp Award in 2013, the award made for recording engineering accomplishment and the development of technology, and in education and raising awareness of engineering heritage and accomplishments. The book also received a National Trust of Australia (ACT) 2014 Heritage Award for an Outstanding Project.

Over many years, Keith has made an exceptional contribution to the recording and recognition of the engineering heritage of both Canberra and, more widely, Australia, through his tireless promotion of heritage in both his professional work, in the community and within Engineers Australia.



¹ *A Centenary of Canberra Engineering* is available through EA Books at:
https://www.eabooks.com.au/epages/eabooks.sf/en_AU/?ObjectPath=/Shops/eabooks/Products/CCE



Putting Water to Work

Steam Power, River Navigation
and Water Supply

Monday 9 - Friday 13 October 2017



*Engineering Heritage Australia invites you to participate in the
19th Australasian Engineering Heritage Conference
9 - 13 October 2017 in Mildura, Victoria.*

The theme of the conference is Putting Water to Work: from the steam power that opened Australia's inland waterways to navigation in the 19th century to the nation-building irrigation and water supply schemes that capitalised on Australia's most precious resource.

Why Mildura?

Mildura is situated in the heart of the Sunraysia district in north-west Victoria on the River Murray, Australia's longest river. The river provides water for Mildura's plentiful grape and citrus crops and many tourist and recreational activities in a year-round sunny climate. The town is the centre of a rapidly-expanding municipality with a population of more than 50,000.

Conference Program

The program will consist of three full days (Tuesday 10 to Thursday 12) of papers and presentations on the water theme and other topics relating to engineering heritage, conservation and practice. The conference will open with an informal welcome event in the evening of Monday 9th and conclude with a relaxed dinner in the evening of Thursday 12th of October. The free evenings will provide plenty of opportunity to sample Mildura's restaurants, wines, and local produce.

A post-conference coach tour on Friday 13th of October will visit engineering heritage sites in Victoria's Sunraysia and South Australia's Riverland and conclude with a country barbeque at the Psyche Bend Steam Pumping station – a unique opportunity to see the historic Chaffey-designed Tangye pump lifting water from the Murray into the lagoon as originally designed.

Getting there

Fly — Mildura has regular flights from Adelaide (1hr 5mins), Melbourne (1hr 5mins) and Sydney (2hr 10mins). Flights from other capitals connect through these cities.

Drive – As part of the conference package, we will provide self-drive engineering heritage tour itineraries from Adelaide, Canberra, Melbourne and Sydney. The direct travel distances by road are: Adelaide, 393 km; Canberra, 800 km; Melbourne, 542 km; Sydney, 1016 km.

For more information, email: heritageconference@engineersaustralia.org.au or go to the

Conference web page at: <https://www.engineersaustralia.org.au/heritage-2017>

From this web page you can click on: Submission of Papers, including Themes & Paper Types, Guidelines & Submission of Abstracts, Templates, Information for Presenters and Key Dates.

Two Key Dates for contributors are: Abstract Submission deadline – midnight AEDT on Friday 31st March 2017.
Paper submission deadline – 30th June 2017

There is a PDF Draft (at present) Program page, which will be built on as time passes, and there will be information about Sponsors & Exhibitors, the Friday Conference Tour, Accommodation, and you can

Register Your Interest to receive regular updates.

The Murtoa Stick Shed – a very big tin shed.

A Cathedral of Wheat in the Wimmera granted a new life.

By Owen Peake.



The Murtoa Stick Shed in 2013, viewed from the north-east.

Photo: Wimmera Mail-Times.

Some of my earliest memories, when I was about four years old, were around the wheat harvest. I lived on the family farm at Yanac South, way out on the edge of the Mallee, north-west of the regional town of Nhill in Western Victoria. Everyone pitched in during the harvest and it was the highlight of the year.



Demonstrating a McKay's all horse powered Sunshine Harvester at work somewhere in the Mallee, probably in the late 1920s.

Ph: Ferguson/Haughton Collection © M. Doring.



Bagging wheat from a horse-drawn Sunshine Harvester in the 1930s. This is probably an experimental rig with an engine to drive the harvester machinery (note the exhaust pipe). Ph: F/H Collection © M. Doring.



The wheat was still harvested by Sunshine harvesters hauled by horses but the farm did own an ancient Chevrolet truck from the late 1920s. The truck was used to take the wheat, in bags, to the silo at the railway station at Nhill.

My father and his two brothers, under the strict direction of their father, worked the farm. The 'boys' hefted the wheat bags from the platforms of the harvesters to the back of the truck – thousands of them each year. The 'boys'

had all served in the Air Force during the World War II. Two of them had flown Catalina flying boats in 'The Islands' and all three had returned without too much damage but some 'hairy' experiences. Lifting wheat bags was another thing, and they all suffered terrible back problems throughout the rest of their lives.



A 1920s truck loaded with bags of wheat, somewhere in Victoria. Photo: SLV.

LEFT: A man stacking bags of wheat at a railway station in the Mallee in 1922.

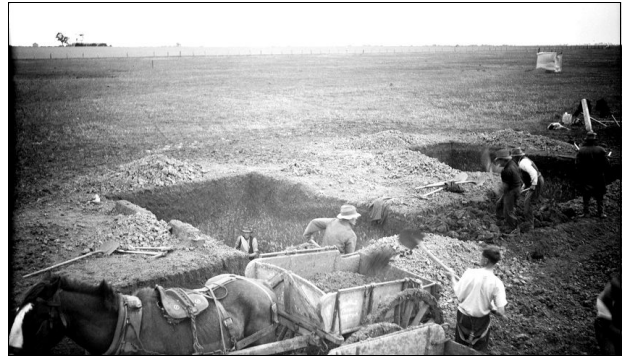
Photo: Bill Boyd Collection, SLV No.MM2257.

The Murtoa Stick Shed – a very big tin shed.

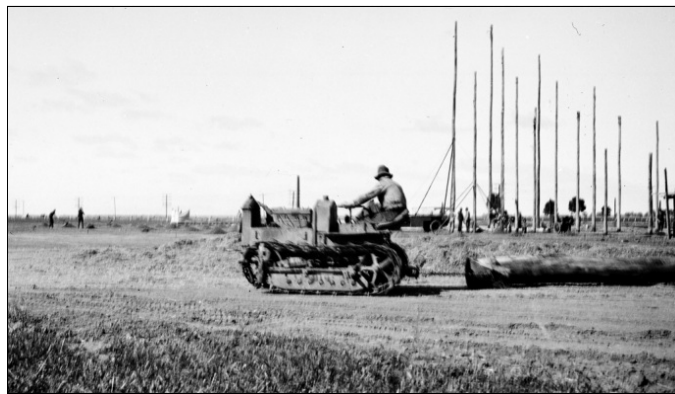
I remember a big event at Nhill when I watched the early stages of a revolution in grain handling as a tip truck dumped a whole load of bulk wheat into a brand new hopper at the silo. Wheat bags were on their way out. Bulk handling was the new way to move wheat. At about the same time, the horses were replaced by tractors, but that is another story.

During the War there was a wheat glut around the world and Australia couldn't sell its wheat. To make matters worse German U-boats were disrupting Allied sea trade and Britain, previously a major consumer of Australian wheat, started to obtain its wheat from the United States as the North Atlantic was a shorter route to Britain than the long haul from Australia. A consequence of the glut was that wheat storages in Australia, and particularly in the Victorian Wimmera/Mallee area and the south-west of Western Australia were overflowing.

In response a number of unusual large wheat storage facilities were built. The first of these was at Murtoa in 1941, just north of Horsham in the Wimmera. Soon after, a second wheat store was constructed at Murtoa, one at Dunolly 50 km west of Bendigo, one at Parkes in NSW and several in Western Australia. The buildings were immense. The last surviving example, at Murtoa, is 280 m long, 60 m wide and 19 m high at the longitudinal ridge. The capacity is 3.4 million bushels, a close to meaningless measure today, but it amounts to about 102,000 tonnes of wheat – which is a lot of loaves of bread.



Digging foundations for the housing tower for the elevator at the west end of the Stick Shed, c1941. Photo: PRO Victoria.



Dragging poles into position with an early caterpillar tractor, 1941. Photo: Culture Victoria.



Stick Shed pole placed in its hole prior to backfilling, 1941. Photo: Culture Victoria



Erecting the Stick Shed poles using a crane truck, 1941. Ph: Culture Victoria.

The structure is braced with diagonal steel rods and finished with a 100 mm thick concrete floor. Grain is delivered to the store by a central conveyor belt running the full length of the building at the highest point under the ridge and removed by conveyors near ground level at the side of the building. To the average farmer in 1942, working with elevators, conveyor belts, trucks and railways was very modern indeed.²



LEFT: The Stick Shed shown soon after the building was completed, probably January 1942. Photo: Source unknown – from Martin Zweep.

RIGHT: The Stick Shed full of grain, soon after completion, probably in February 1942. Photo: State Library of Victoria.



1 The common name for this material has always been 'iron' but it is actually thin corrugated steel sheet.
2 Green Jonathan, *The Sheer Vastness of it*, ManSpace Magazine, 29 January 2013.

The Murtoa Stick Shed– a very big tin shed.

The construction is described as of architectural significance as an expression on an unusually grand scale of the Australian rural vernacular corrugated-iron tradition³ and the outside appearance, although impressively large, is superficially similar to any other tin shed. The interior space is, however, in quite a different league. The vast interior with its predominant theme of verticality, generated by the veritable forest of poles, presents perhaps the most impressive interior space anywhere in Australia. This space has often been compared to the great cathedrals of Europe. Whatever comparison one applies, the interior space is incredibly atmospheric and superlatives like 'breathtaking' and 'amazing' seem quite inadequate.

Finding a use for this massive space, 16,800 square metres, since its retirement as a grain store, has been an ongoing challenge. Nevertheless the sheer majesty of the space suggests a high level use, as the space would lend spectacle to any exhibition or event held there. The building is certainly in the same class as the Crystal Palace in London (now sadly gone) and the Royal Exhibition Building in Melbourne.

The Stick Shed remained in use as a grain store until the 1989/1990 wheat harvesting season after which, because it could no longer be kept pest and insect free, it was judged non-viable for grain storage, and was becoming very expensive to maintain. The last grain in it was cleared out and it was left empty and purposeless and probably under threat of demolition. But it was still owned by the Victorian Government and considered to have great heritage significance, so in November 1990 the Stick Shed was added to the Victorian Heritage Register under VHR number H0791. In 1992 the government owner, the Grain Elevators Board appealed to VCAT (the Victorian Civil and Administrative Tribunal) to have the shed removed from the Heritage Register, but failed.

Many people in the district considered the Stick Shed to be an eyesore and a blot on the landscape, and supported the move to demolish the shed, but there were a few who valued its unique properties and they had formed a group to defend it at VCAT. One of the defenders was a newcomer to Murtoa in 1990 – Leigh Hammerton. *He was immediately struck by the Stick Shed and has since become something of a local voice (and authority) for it – publicly defending its validity and potential, even in its darkest hours.*⁴ Hammerton, and other locals, have been arguing and lobbying ever since to encourage rehabilitation and re-use of the shed.



The interior of the Stick Shed photographed in 1992, soon after it was emptied for the last time. Scale is indicated by the tiny figure at lower left. Ph: Culture Victoria.



ABOVE: The interior of the Stick Shed in March 2009, before repairs began. Note the large hole in the roof at left. Photo: Martin Zweep, Heritage Victoria.

In the mid 1990s the Victorian government instrumentality that owned the shed, and the whole site, was privatised. This company, (VicGrain, later Graincorp) didn't want the Stick Shed, but it bought all the surrounding land, leaving the still government owned Stick Shed marooned on an island to slowly rot away with no maintenance and no easy access. Things came to a head when bits of roof started flying off in a storm, and the changes in the building could not be disguised.



RIGHT: A large hole in the roof of the Stick Shed, seen in October 2010, before repair work started. Photo: Owen Peake.

³ From the Heritage Council database for the Murtoa Grain Store at: <http://vhd.heritagecouncil.vic.gov.au/places/868/download-report>
⁴ Green Jonathan, *The Sheer Vastness of it*, ManSpace Magazine, 29 January 2013.

The Murtoa Stick Shed– a very big tin shed.

Unfortunately over time, without a use or user to pay for and undertake necessary maintenance works, the building began to deteriorate. In 2008 the Victorian Heritage Council became concerned about the condition of the building and the unlikely potential for a new owner in the immediate future, and felt that action needed to be taken to repair the building before it was lost. The Heritage Council secured a grant, and: With an initial budget of \$1.2 million of Heritage Council money repair works started in early 2009.⁵ The reclaiming of the Murtoa Stick Shed from imminent demise had begun. The Victorian Heritage Council formulated a plan for the building. Martin Zweep in Heritage Victoria has been managing the restoration of the Murtoa Stick Shed and appointed Greg Owen of Period Building Conservation to, initially, conduct a survey of the condition of the shed. The survey was completed in 2008 and concluded that the building was repairable.



Pulling a rotten pole stump with a forklift. The upper pole has been moved aside & is held by scaffolding.
Photo: Martin Zweep, January 2011.

They had originally been planted about one metre direct in the ground and there was a high water table in the area. This had led to rot and termite attack, particularly of the in-ground part of the poles, and to termite migration to the roof structure with consequent damage to the poles and roof members. The solution to this problem was to temporarily lift the poles individually, cut off the rotten lower portion and build a reinforced concrete footing in the original hole. The pole was then placed back on the new concrete footing and connected to it by plates embedded in the footing to resist uplift forces.



New concrete pole footings with shortened poles bolted to them & diagonal bracing rods passing through them.
Photo: Martin Zweep, May 2011.

With some of the shorter poles, a somewhat less intrusive method was adopted whereby the poles were lifted to the correct height and a fabricated steel cross member was added, bolted through the pole and to the floor. In a few cases the poles were too badly deteriorated and were replaced altogether with steel poles. Poles which were wasted due to the deterioration of sapwood, reducing their effective diameter, were fitted with bow trusses constructed around the existing poles using steel spreaders and cables. Four bow trusses were fitted to each pole treated in this way. The method restored the required resistance of the poles to bending forces.

Once the poles were repaired, the roof sections which had sustained damage were repaired, connections re-made and new members installed where necessary. New sheeting was then applied to the roof to patch areas which had collapsed. Diagonal bracing was repaired and termite infestation treated. The building was now watertight and its structure restored to something like its original condition.

The repair of the Murtoa Stick Shed was seen as a considerable achievement by the wider heritage community. Locally, much of the population had thought that the shed was an eyesore and was doomed by its deterioration. They were greatly surprised by the relatively easy repair which had been achieved and their attitude to the building was transformed to one of pride and support. Along the way the shed maintained its protection under the Victorian Heritage Act and later, in 2014, the shed was added to the National Heritage Register.

Owen Peake.

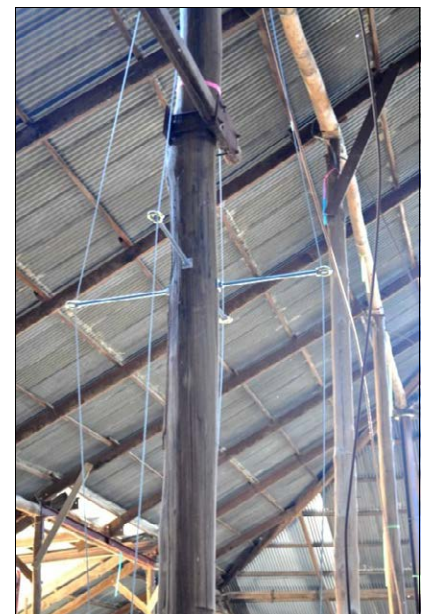
Reference:

Further information about the Stick Shed can be found in a paper presented at the 16th EHA Conference, held in Hobart, Tasmania in November 2011. This paper, *The Murtoa Stick Shed – New Life for a Wheatbelt Cathedral* by Martin Zweep, Conservation Officer, Heritage Victoria is at <http://search.informit.com.au/fullText;dn=895365462828509;res=IELENG>

The nature of the repairs is worth a quick review for the benefit of those who are unfamiliar with the story. Greg Owen's investigations revealed that the primary problems were around the poles.



Repaired pole on its new concrete footing, showing diagonal bracing & the lower attachments of the bow trusses.
Photo: Heritage Victoria, 2011.



Pole with bow trusses fitted.
Ph: Owen Peake 2011.

⁵ Zweep, Martin, *the Murtoa Stick Shed – New Life for a Wheatbelt Cathedral*.

An American's view of Australian Engineering Heritage.

by John Schultz

Introduction

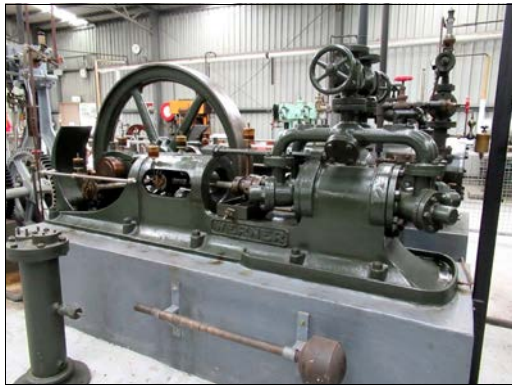
In July last year, John Schultz of Washington, Illinois, wrote to me asking how he could subscribe to the EHA Magazine. He mentioned, in passing, that he was planning a trip to Australia, and then New Zealand, in September and October. I sent him the link to the magazines and asked him about the itinerary for his trip, which he sent the next day. I suggested some extra places to visit in Melbourne and Sydney and said: 'Perhaps you would like to write a story about it for me? An American's view of Australian Engineering Heritage?' And so here it is – a diary of all the things he saw and did while he was in Australia (and New Zealand if there is room). And unless otherwise attributed, all photos in this diary are by (or from) John Schultz.

The Editor

John Schultz's Diary of his trip to Australia

Early in 2016, *Trains Magazine*, in combination with 'Special Interest Tours', offered a trains-oriented tour of Australia and New Zealand. For the first time of offering trips like this, they were unable to peak enough interest to do a full tour. As a result there were seven of us on the Australia portion and nine for New Zealand. The organisers counter-offered with a price reduction to do a 'self-guided' tour. With that, all the hotels and transportation were arranged by Hannah Barnes of Special Interest Tours and we were on our own to make it all happen. And it was great!

September 26 (Monday): Bill Steil and I arrived a day early in Melbourne to 'decompress'. We met Steve Holmes who had a different plan and was on the ground running! We rode trains and trams around Melbourne and eventually we arrived at the National Steam Centre in Scoresby¹. He arranged for the gates to be opened for us and what an amazing collection of steam and internal combustion engines and equipment. Incredible is an understatement!²



R. Werner & Co. P/L, Richmond, Vic. c1910 steam driven ammonia compressor, used at Footscray Gas Works. Such machines were widely used for refrigeration before mains electricity supply.



Crossley Bros. Ltd., Manchester, UK. 1924 diesel engine with a single horizontal cylinder, used for teaching engineering students at Melbourne University.

Even though I subscribe to Old Glory Magazine, I had no idea Fowler Ploughing engines were that big! And the two triple expansion ship engines were awesome!



The main engines of the former twin-screw, sea-going, steam tug Lyttelton 2, built by Renfrew & Co Ltd, Renfrew, Scotland in 1939. Part of one of the twin screws is visible at left.



The gate sign at the National Steam Centre.



Steve & John demonstrating the size of the Fowler Steam Ploughing Engine, 'Susie Jane'.



The tour ended with Andrew and Peter [of the Steam Centre] giving us a ride around the grounds on the 12-inch gauge railroad.

So here are Bill (at rear), Steve (centre) and John (front) in the little train.

¹ Owen Peake wrote a story about the National Steam Centre which was published in the very first issue of EHA Magazine in December 2013, and again in *Steamfest* on page 4 of the April 2016 issue.

² More information about some of the machines in the National Steam Centre can be found in the Nomination document for the National Steam Centre Collection to be awarded Engineering Heritage Recognition. Find it at <https://www.engineersaustralia.org.au/portal/heritage/national-steam-centre-1973>

An American's view of Australian Engineering Heritage.



The signal box & a train crossing Riversdale Road.

Another great visit – we saw four big triple expansion steam pumpers used for sewage management. Along with those there were other traction engines and tractors to view as well.



No.10 steam pumping engine at Spotswood.

We ended the day by having dinner on Melbourne's Colonial Tramcar Restaurant [seen at right] and travelling all around the City consuming great Australian cuisine!



September 26 (Continued): We ended the day by visiting an interlocking tower [signal box] at the intersection of tram and train lines on Riversdale Road, Camberwell, along with the street control gates. This is a very complicated operation and how anyone can keep track of all that activity is beyond me!

September 27: Bill and I made the trek to Science Works.³ The person at the ticket office asked us what we were interested in and when we told her we wanted to see the engines, she let us in for free!



Spotswood Pumping Station at Science Works, viewed from the river bank road.

After we took our pictures [at Spotswood Pumping Station], we met our Australia Group at the train station. Steve Holmes took us to visit the Steam Rail Museum and a walkabout of [the Newport Railway Workshops] where they restore and rebuild 'fan trip' steam locomotives and [rail] cars. We also viewed from afar a collection of vintage trams stored outside.



Inside the Loco Sheds at Newport Railway Workshops.



Melbourne's Southern Cross Railway Station and a tram in Collins Street.

September 28: We took the V/line train from the Southern Cross Station to Castlemaine where we picked up the Victorian Goldfield Steam Train to Maldon, a vintage gold mining town.

We rode first class on the Castlemaine to Maldon train.

[See at left – a First Class carriage on the Maldon Train]

³ There is a story about the Spotswood Pumping Station at Science Works, *Building Melbourne's Sewerage System*, on page 21 of the March 2015 EHA Magazine.

An American's view of Australian Engineering Heritage.

September 28 (Continued): When we got to Maldon, we had two hours to walk around the old mines and town. It was interesting to see an old steam locomotive in the playground with kids climbing all over it.



Old steam loco ('toy train') near the Maldon Railway Station.

During our two-hour layover, one of the kids who rode the train with us from Castlemaine was in the cab [see at left] helping with switching the locomotive for our return.

September 29: Our train departed Southern Cross to Belgrave and from there, it was a short walk to the Puffing Billy station. We rode double headed for half of the way and then a single loco to Lakeside. When we got back, we were able to view the Garratt loco out in the yard. Then one of the volunteers took us on tour of their workshops where another Garratt was being built. Puffing Billy Railroad is a very popular tourist attraction with several trains running throughout the day.

When we returned to Southern Cross Station, we boarded XPT CLK 622 to travel to The Rock station near Wagga Wagga in NSW, where we were picked up (at midnight in the rain) by Dennis of the Hanericka Farmstay.



Puffing Billy crossing one of the trestle bridges on its route.

Photo: Gray Line Tours.



September 30: It continued to rain at the Farmstay but the food and hospitality were outstanding! Water was running furiously over the road so our hosts were busy entertaining and using a four-wheel drive SUV to ford high water in the ditches running across the road. The farm had many animals to view including camels, sheep, cats, horses, ducks, chickens, etc.! Dennis took us to the Train Museum/Roundhouse in Junee. Thankfully the weather was fine but there was much water between there and the Farmstay.

LEFT: Junee Roundhouse

RIGHT: Model Railroad

BELOW: A Mail Car at the Junee Museum. The labels on the wire mesh sorting boxes have the names of towns & whistle stops on the mainline & branch lines.



The roundhouse was another interesting visit with a model railroad set up in the entrance of the museum. And then there was the chocolate factory visit in Wagga Wagga!

An American's view of Australian Engineering Heritage.

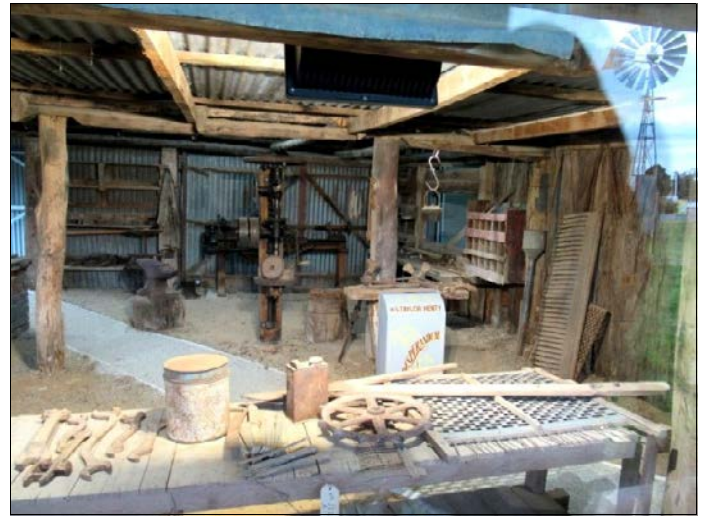


Above: The Headlie Taylor Museum on the Wagga Road at Henty.

September 30 (Continued): On the way back [to the farm], Dennis took us to an interesting wayside kiosk [a glass walled building] along the road [inside which] there was an old preserved horse-drawn harvester that apparently was invented in the area. [Also Headlie Taylor's Blacksmith Shop where he built his first header harvesters].⁴

Below Left: One of Headlie Taylor's earliest Header Harvesters c1915 seen through glass.

Below Right: The relocated Blacksmith Shop where Taylor built his first Header Harvester, re-erected behind glass in the Museum.



October 1 (Saturday): Dennis gave a tour in his SUV of his 17,000 acre farm. There was water (and mud) everywhere but everything was so green, or yellow if it was canola! At noon we boarded a train at The Rock station, a flag stop, and we travelled up to Goulburn where we met Steve Holmes who transported us to the Streamliners event.⁵ This was an evening event where we viewed a collection of vintage diesel locomotives. The event ended a cold (but dry) evening with a fireworks display in and around the old diesel locomotives.

Right: Vintage diesel locomotives lined up at Streamliners 2016



The Pumphouse at the Goulburn Waterworks supplied water to the town from 1886 to 1977.

October 2: This was a "free" day in Goulburn so the two Bob's, Sue, Bill and I took the opportunity to walk into town. After spending several hours there, we discussed a transportation option with Steve Holmes. We found out at the visitor centre that there was a preserved (steam) pumping station in town.⁶ Our driver kindly took us there before we went back to the Streamliners event. A great visit of another vintage beam pumping engine! [The 1883 Appleby beam pumping engine and boilers.]

Below – Left to right: One of a pair of 1883 Lancashire style boilers; the beam of the 1883 Appleby Pumping Engine; and part of the Appleby Pumping Engine below its beam.

(All at Goulburn Waterworks.)

None of our group (including our driver) had ever seen anything like [the Appleby Engine] so we were all over the building to inspect it. There was a very fine Corliss engine in there, as well, that had powered a woollen mill.



⁴ The story of Headlie Taylor and his Blacksmith Shop, and the Header Harvester, can be found on page 6 of the December 2014 issue of EHA Magazine

⁵ Streamliners 2016 was a festival at Goulburn NSW, where there are extensive rail yards, celebrating 65 years of Streamlined locomotives.

⁶ For more information see: <https://www.engineersaustralia.org.au/portal/system/files/engineering-heritage-australia/nomination-title/Goulburn%20Waterworks.pdf>

An American's view of Australian Engineering Heritage (& the tourist trail).

October 2 (Continued): When we were done, our driver took us back to the Streamliners event. This time, the weather had moderated and we got to see way more than the night before. Lots of photographers were all over the engines and grounds. They had a nice model railroad on display that was well worth viewing.



Arriving at Central Station Concourse.



Catching a double-decker train to Circular Quay Station.

October 3: We rode the train up to Sydney where we met Dick & Diane at the hotel. They suggested a ferry ride to Watson's Bay for Fish and Chips. It was a great ride to see Sydney from the water and the food at Watson's Bay was outstanding!



Circular Quay Ferry Wharves, cruise ship and Harbour Bridge.



Dinner at Doyles on the Wharf.

There was a huge overlook in a park behind the restaurant that had some strange birds that entertained us as we braved the views and wind up there [at The Gap, looking out to sea & back to the City]. The ferry took us back to port and from there we walked to the Opera House.



ABOVE: Navy ships & the north end of the Finger Wharf in Woolloomoolloo Bay.

LEFT: Looking back to the City and the Harbour Bridge from above Watsons Bay.



The Opera House seen from the Watsons Bay Ferry.

Bill and I determined it was worth a tour [of the Opera House] while Dick and Diane acquired "My Fair Lady" tickets for the next night. Because of the Labor Day holiday weekend, Bill and I were able to visit and take pictures everywhere because there was only one event scheduled in the entire complex. The main auditorium with the pipe organ was awesome! The stories of the architect bailing out, never seeing completion, and the future ten-year remodelling project were interesting. And even though we saw tourists on top of the Harbour Bridge, none of us were brave enough to take the opportunity to do that!



The Concert Hall stage & the organ at the Opera House.



October 4: We all made the short trek to visit the Queen Victoria Building, suggested by Margret Doring. It was probably the nicest shopping mall any of us had ever seen! It is amazing that it was close to demolition in the 1980's.

LEFT: The Queen Victoria building view from the north in York St.

RIGHT: A shot of a small part of the interior of the QVB.



An American's view of Australian Engineering Heritage (& the tourist trail).

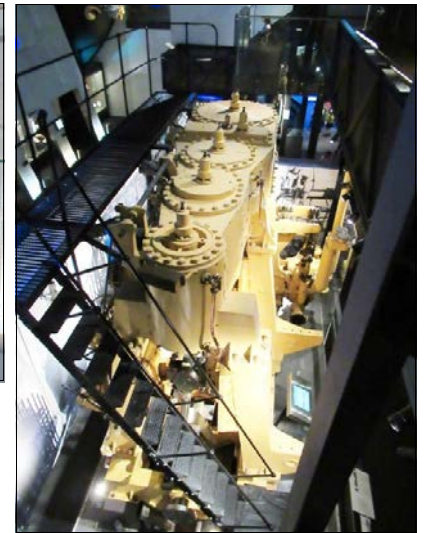


Operator's cabin for the Pyrmont Swing Bridge, which opened to let ships through to the end of Darling Harbour.

October 4 (Continued): After visiting the Queen Victoria Building, we decided to go our separate ways, and I walked to the Maritime Museum [crossing Pyrmont Bridge on the way]⁷. I met a model builder who told me all about the Norfolk Island Pine he used to produce the intricate models he was building. Then inside, there was a very nice huge triple expansion steam ship engine being turned over slowly with an electric motor.⁸



Col Gibson, volunteer model maker at the National Maritime Museum.

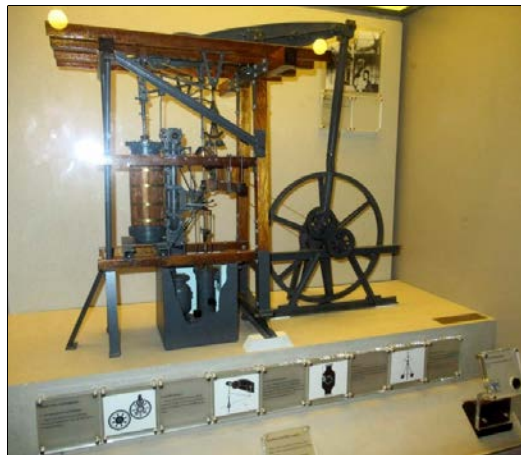


Triple expansion steam engine from the Sydney Ferry 'Kara Kara'.

From [the Maritime Museum], it was a long walk over to the Powerhouse Museum where the original Australia steam train is on display to greet visitors. Along with a huge 1784 Boulton & Watt steam engine behind it, there were a considerable variety of other interesting steam engines displayed. There I met up with Bob from Sacramento. He and I visited (walked to) probably the biggest and finest book store anywhere!



Sydney's first train at Powerhouse Museum.



LEFT: It was very difficult to photograph the complete 1784 Boulton & Watt steam engine, so John found a model of it at the museum to photograph instead.



Walking back to the hotel from the Museum, they found this strange new building on the Sydney University of Technology campus.

October 5 (Wednesday): With another "free" day, some of us took a bus trip up to the Blue Mountains to visit the 'Three Sisters'. We had a fantastic driver who took us on this two-hour trip, explaining much along the way and how coal mining was done in the area in the old days. He dropped us off at an incline that took us up to a cable car ride over a huge ravine. He then drove us to several windy [look outs]. There was an aborigine show to entertain us, and a visit to a wildlife park to view koalas, kangaroos, Tasmanian devil, penguins, dingos & wombats. The evening ended with a scenic ferry ride back to Sydney.

So ends John Schultz's account of his visit to Australia. He went on to New Zealand for another eight days, but sadly I don't have the space to include the New Zealand section of his diary.

The Editor.



RIGHT: John Schultz in the Blue Mountains, with the Three Sisters in the background.

LEFT: A last look at the Harbour Bridge on the way back to the City in the ferry.



⁷ Find the story of the Pyrmont Swing Bridge at: https://www.engineersaustralia.org.au/portal/system/files/engineering-heritage-australia/nomination-title/Pyrmont_Bridge_Darling_Harbour_Nomination.pdf

⁸ The steam engine was from the Sydney Ferry *Kara Kara*. Built in the UK in 1926, she ferried cars across the Harbour until the bridge was built. Commissioned HMAS in WW2 she served in Darwin & was bombed in 1942. She was sold for scrap in 1972, and this engine is all that remains of her.

The Case of Two Missing Engineers.

Charles Ellis in California & Thomas Hodgson in Western Australia.



The Golden Gate Bridge on December 15, 2015, photographed by D. Ramey Logan from just north of Alcatraz Island.

An article which appeared in the April 2015 edition of the *Engineers Australia* magazine on the Golden Gate Bridge stated that Charles Alton Ellis, an expert in structural design, was the main design engineer on the project, and, commencing in 1929, did most of the design calculations in consultation with consulting engineer Leon Moisseiff who was at the time a leading theorist and designer in the new field (to the USA) of suspension bridges, which originated on the east coast of USA.



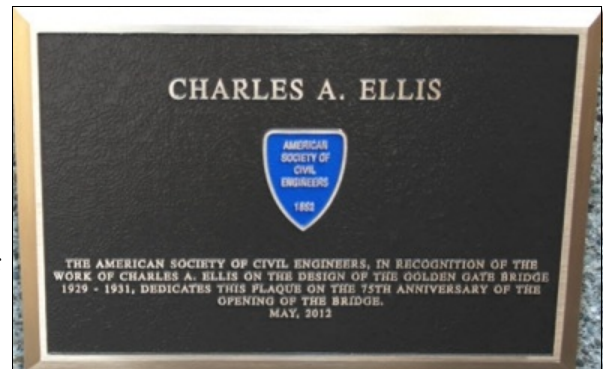
Charles A. Ellis. from PBS, Mary Cone.

What the article did not say is that Ellis was unjustly dismissed by the bridge Chief Engineer Joseph B. Strauss in November 1931 when the design work was essentially complete, ostensibly because Ellis was wasting too much time sending telegrams from his office in Chicago to Moisseiff in New York. (Note: the project initially bid – went to tender – in July of 1931, so the design must have been essentially complete).

There is little doubt that Strauss, who was best known for designing bascule bridges, did not want to share the credit for what was to become one of the most recognisable bridges in the world. Ellis however continued to work 70 hours per week for five months after his dismissal, on an unpaid basis, eventually producing ten volumes of hand calculations.

Ellis, the first of our *Missing Engineers*, was not invited to the opening ceremony and his name does not appear on the plaque unveiled at the opening ceremony in May 1937. In spite of efforts by Russell G. Cone, (Resident Engineer of the Golden Gate Bridge 1933 to 1937)

to have Ellis recognised for his design of the bridge, Charles Ellis died in 1949, never having received public recognition for his role in the design.



The ASCE plaque for Charles Ellis, unveiled May 2012 at the bridge.



The Golden Gate Bridge from the Bay side, 2007. Photo: Don Young

In 1984 the American Society of Civil Engineers (ASCE) named the bridge a National Civil Engineering Landmark. In May 2007 the Golden Gate Bridge District issued a formal report giving Charles Ellis the major credit for the design of the bridge. In May 2012, the 75th anniversary of the opening of the Golden Gate Bridge, the ASCE unveiled a plaque at the bridge site recognising Charles Ellis for his work on the design of the bridge 1929 – 1931.

The full story of the design and construction of the Golden Gate Bridge has been covered in detail in a book *The Gate, The True Story of the Design and Construction of the Golden Gate Bridge*, by John Van Der Zee, published by iUniverse, Inc, USA.



Helena Valley & the Goldfields Water Supply No.1 Pumping Station at Mundaring Weir.
Photo: from Don Young.

Dave was very impressed with the book and Engineering Heritage WA soon received an invitation to make a submission to the ASCE for its International Historic Civil Engineering Landmark award. In October 2009, following the success of the submission, the ASCE made an IHCEL award to the Owner, the Water Corporation of Western Australia, for the Goldfields Water Supply Scheme. The plaque not only mentions the PWD WA Engineer in-Chief Charles Y. O'Connor but also the project's Engineer-in-Charge Thomas C. Hodgson, a hydraulics engineer who, as O'Connor's deputy, had been involved in the investigation, design and construction management of the project since its inception in 1895.



T. Hodgson, W. Reynoldson & E. Fenton at No.2 Pumping Station,
13th April 1902, from Don Young.

Significantly the American Society of Civil Engineers was involved on both occasions when belated recognition was given to the two *Missing Engineers* on two continents, both of whom had made vital contributions to the success of two internationally recognised engineering projects.

By Don Young, *Engineering Heritage WA*

References:

An article about the Charles Ellis story, 'The Case of the Missing Engineer' appeared in the USA magazine *Image* in May 1992. It can be obtained, on request, from Don Young or from the Editor of EHA Magazine.

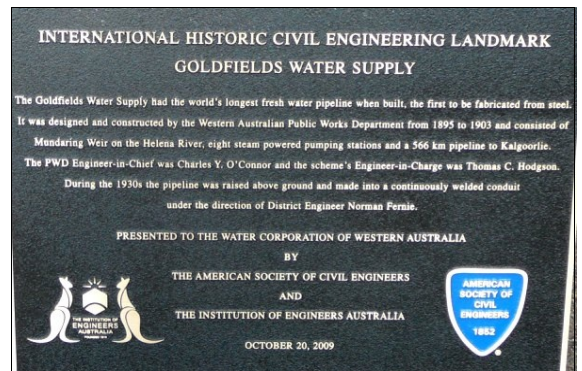
Look for more about the Golden Gate Bridge from the US PBS service can be found at <https://www.engineersaustralia.org.au/portal/system/files/engineering-heritage-australia/nomination-title/Coolgardie%20Goldfields%20-%20Nomination.pdf>

For more about the Goldfields Water Supply, go to the nomination document for Engineering Heritage recognition:

<https://www.engineersaustralia.org.au/portal/system/files/engineering-heritage-australia/nomination-title/Coolgardie%20Goldfields%20-%20Nomination.pdf>

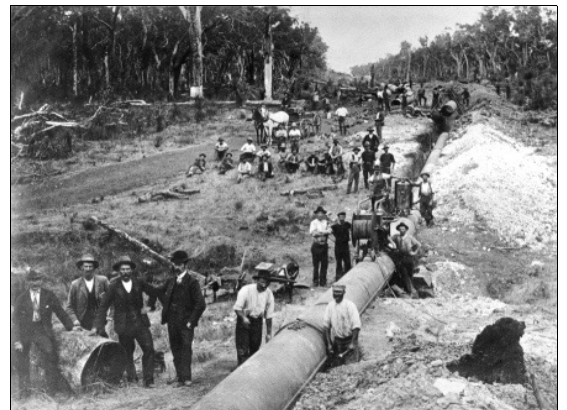
The second (& earlier) Missing Engineer – Thomas Hodgson in W. A.

There is an interesting parallel to the Ellis story in Western Australia. In late 2007 Dave Gilbert, a retired American mining engineer who had worked in Western Australia in the 1970s and who was then a member of the ASCE History and Heritage Committee, was at a family picnic with his Australian born wife Lyn at Mundaring Weir. He noticed an impressive brick building and chimney stack nearby and after a visit to the No.1 Pump Station museum, staffed by National Trust WA members, he obtained a copy of the recently published *River of Steel – A History of the Western Australian Goldfields and Agricultural Water Supply 1903–2003* by the late Richard G. Hartley. This book had been commissioned by the Water Corporation of WA to commemorate the 100th anniversary of the completion of the original scheme in 2003.



Goldfields Water Supply IHCEL plaque at Mundaring Weir.
from Don Young.

Following C.Y. O'Connor's untimely death in March 1902 Hodgson was forced to resign, in controversial circumstances, from the PWD WA, in May 1902, seven months before the successful completion of the scheme, and, as with Charles Ellis, a later *Missing Engineer*, also was not invited to the opening ceremony of the Goldfields scheme in January 1903. Readers can read the full story of the foregoing in *River of Steel*. Hodgson's valuable contribution to the success of the scheme was recognised on plaques provided by the ASCE and unveiled at separate ceremonies at Mundaring Weir and Mt Charlotte Reservoir, Kalgoorlie, in October 2009.



Laying pipe for the Goldfields Water Supply across the Darling Ranges. Photo courtesy the Forrest Family.

Woolloomooloo Finger Wharf

The rise, decline & amazing resuscitation from near death of a Sydney icon (part 2 of 3)

By Margret Doring, former Engineer Specialist in the Heritage Branch of the NSW Department of Planning.



Part of the 1983 UBD Sydney City maps 1 & 2 showing Woolloomooloo.

In the July 2016 EHA Magazine we published Part 1 of a history of the Woolloomooloo Finger Wharf, in Woolloomooloo Bay, Sydney Harbour. That Part 1 of the story of *The rise, decline & amazing resuscitation from near death of a Sydney icon* got as far as the wharf's decline. The wharf had been empty, neglected and forgotten for years when I take up the story again in 1984. The Housing Commission had gradually transformed the suburb of Woolloomooloo south of the wharf by rebuilding, recycling and renovating the dilapidated slum housing into comfortable housing with all *mod. cons.* for low income people.

The Navy had extended their operations south from Garden Island, flattening the old wooden wharf sheds, woolstores and warehouses along both sides of Cowper Wharf Road east of Woolloomooloo Bay, creating an almost empty amphitheatre, lined with parked cars, in the centre of which the Finger Wharf stood like a huge monolith, drawing all eyes. And then the Navy built its flamboyant multi-storey concrete car park, backed up against the cliff below Victoria Street and pointing up the contrast between the dilapidated buildings on the Finger Wharf and rejuvenated Woolloomooloo. The Wharf was back in the public eye, and many in the public were not impressed with its sordid appearance. Something must be done about this eyesore!

The NSW National Trust responded in September 1984 by classifying the Finger Wharf as *WOOLLOOMOOLOO DEEP SEA WHARVES Nos. 6,7,8 and 9 and CARGO SHEDS*. It had been on the books of the Trust's Industrial Archaeology Committee for some years, since a sub-committee had put together a report on *Historically Interesting Deep-Sea Wharves* in 1976, but it seems to have been lumped together with all the other "deep sea" wharves. Presumably the Trust wrote to the Maritime Services Board (MSB), or the Minister, pursuing their case

because: *In late 1984 representatives of the National Trust were informed, by the Minister for Ports, that the Woolloomooloo Finger Wharf was to be conserved and incorporated within a proposed Marina development. This announcement by the Minister was strongly supported by the National Trust at the time.*¹

The idea obviously became a talking point around Sydney – the Sydney Morning Herald (SMH) *Good Weekend* on the 9th February 1985 had a feature article *Concrete versus people at the 'Loo*. This is largely about the rash of car parking in the area (mentioned above), the proposed frigate wharves to replace wharves 1 to 5 along the east side of the Bay, and drains, but the Finger Wharf does get a mention: *In the middle of the bay the MSB is planning to convert the finger wharf it still owns into a marina for private boats and visiting yachts. The wooden warehouses on the wharf will be converted into shops and offices to serve the boating industry. There will be food outlets, restaurants, and, possibly, a few apartments. The MSB is eager to see this development completed for the bicentenary year, 1988. The Navy has made no public comment, as yet, on the proposal.*

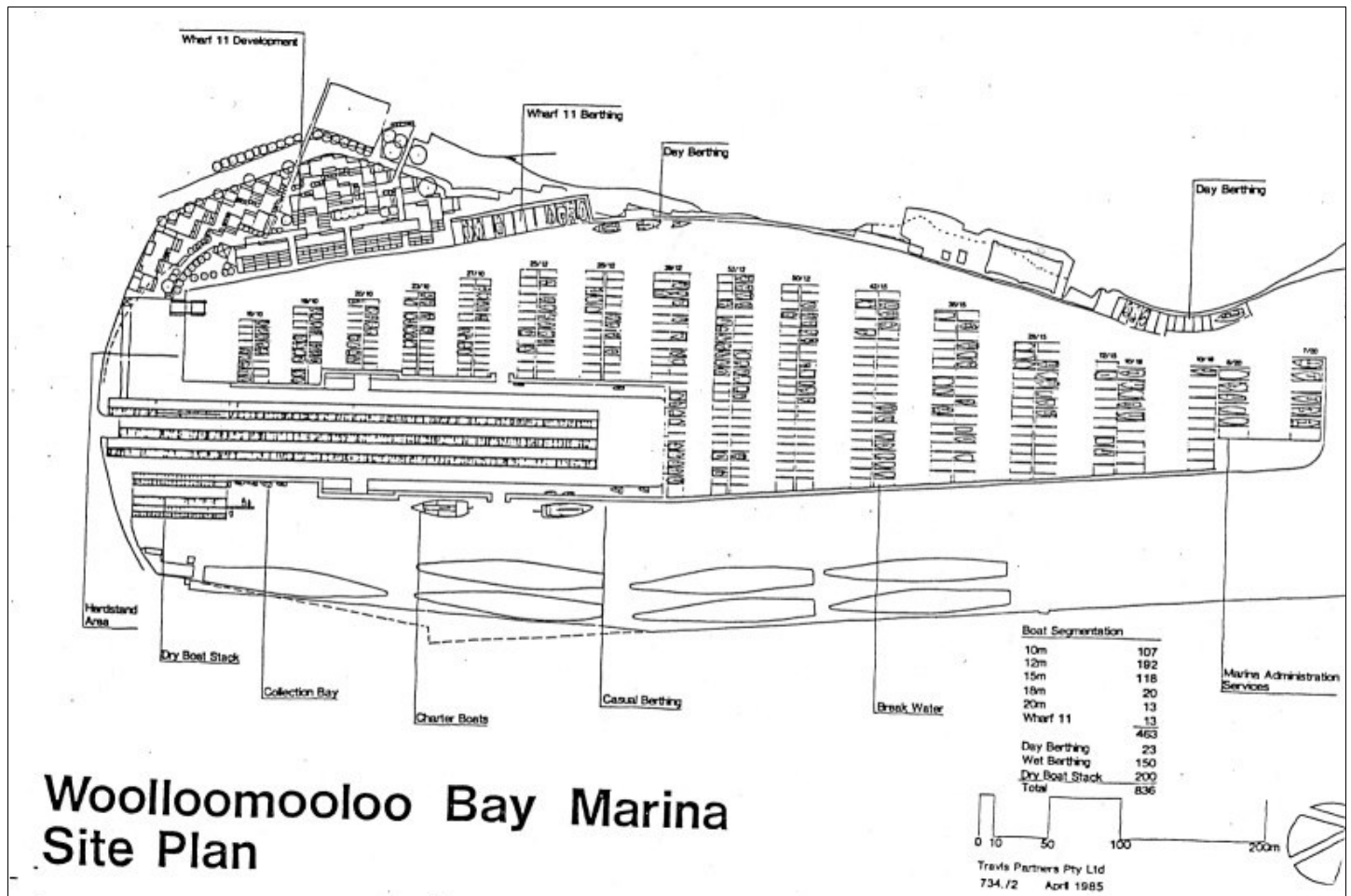


Photo from "Good Weekend", 9 Feb 1985, shows a Navy ship at the fitting out wharf (No.1), the cleared land at wharves 2,3 & 4, the Navy Car Park at left (next to the text breakout), and Woolloomooloo Finger Wharf at the south end of Woolloomooloo Bay. Photo: Sydney Morning Herald.

¹ Submission to the Maritime Services Board – Woolloomooloo Bay Development Environmental Impact Statement Nov 1987, National Trust of Australia (NSW).

Woolloomooloo Finger Wharf

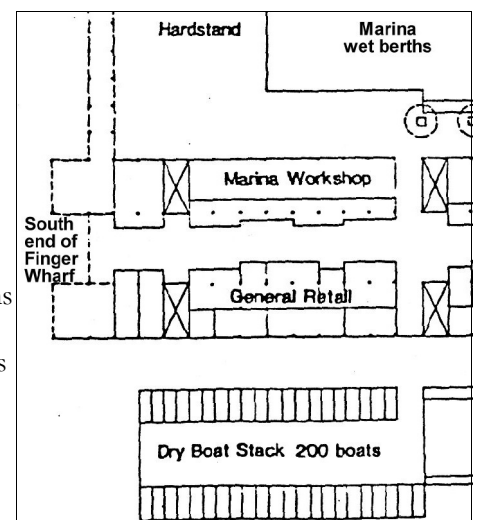
I can't imagine how the SMH got wind of this project – someone kept his or her ear very close to the ground. Nothing was public on 9th February 1985, but by the 20th February, a conglomeration of consultants headed by McLachlans, a firm which specialised in organising such groups, was presented with a *Terms of Reference for a study of the feasibility of using the cargo wharves of Woolloomooloo Bay (Berths 6, 7, 8, 9 and 11) as a major marina and boating facility*. Those consultants must have worked like the clappers, because their *Stage 1 report on redevelopment of Woolloomooloo Bay* was presented to the MSB on 26th April 1985. As I remember, the report reached my desk at the Department of Planning (DofP) quite some time later.



Woolloomooloo Bay Marina Site Plan (proposed) as it appears in the McLachlan "Stage 1 report on the redevelopment of Woolloomooloo Bay". The Plan allows for 636 wet berths in & around the marina, for boats from 10 metres to 20 metres long, & 200 dry berths for smaller boats. Seven Navy ships are shown berthed along the east shore.

Dwg: Travis Partners Pty Ltd, April 1985.

The consultants – the study team – were project managers, architects, property marketers, merchant bankers, marina marketers, civil/structural engineers, electrical/mechanical engineers, marina engineers and transportation engineers – a pretty comprehensive lot. But not one of them addressed the implications of and possibilities inherent in the heritage significance of the wharves and their setting. Not surprising when one considers the *stated objectives of the study* did not include any reference to environmental heritage or the environment. *The specific Terms of Reference for the feasibility* [of the project] did include *Environmental: studies of environmental and social impact, leading (outside this study) to an EIS, including heritage and conservation issues ...*² The words *outside this study* presumably implied the absence of any such considerations "inside" the study. Certainly there is no appearance of the words heritage, conservation, or significance anywhere in the Recommendations. However there was a Preliminary Conservation Policy in the Environment & Conservation section, but only following consideration of Traffic & Parking, Noise, Lighting and other such concerns, giving an impression that heritage and conservation were trivial matters, and could be overlooked. If heritage and conservation were overlooked by later consultants I wouldn't have been surprised. It is not clear whether the McLachlan Consultants report ever became a public document. I never saw any mention of it in the media.



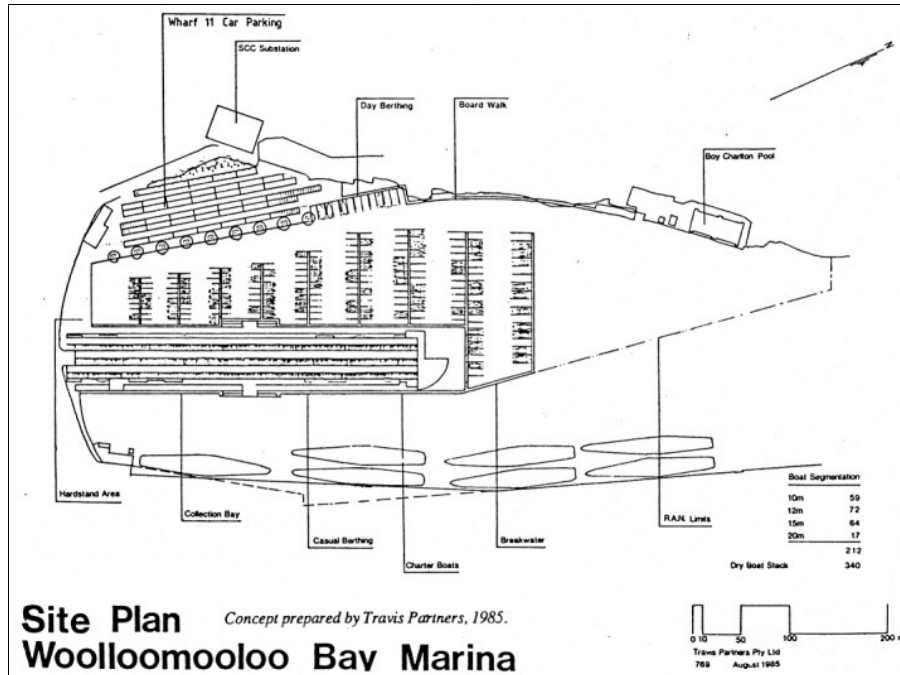
Detail of Finger Wharf Plan Level 1 shows a dry boat stack for 200 boats, built off the south end of Wharf 6, far from marina berths & hardstand.

Dwg: Travis Partners Pty Ltd, April 1985.

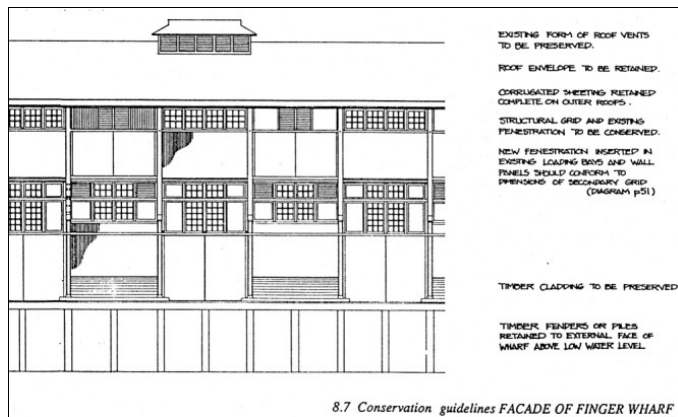
² Stage 1 Report on Redevelopment of Woolloomooloo Bay for the MSB of NSW, McLachlan Consultants, 26 April 1985.

Woolloomooloo Finger Wharf

It was not until early the next year, in February 1986, that the Minister for Public Works & Ports, Laurie Brereton, announced a proposal to build a marina at Woolloomooloo, and when he announced that tenders were to be called for the *Woolloomooloo Marina Development*, it is understood that he specified that the finger wharf had to be retained.³ He called for registrations of interest from organisations with the financial, development and management skills to carry out the development of Woolloomooloo Marina in return for the right to use the completed facility under a long-term lease arrangement. The registration period closed at end-March 1986 with a considerable number of organisations expressing interest.⁴



This Site Plan in the August 1986 Tender Documents changed considerably from the 1985 McLachlan Site Plan. The dry boat stack has been moved inside the Finger Wharf sheds, the car park has been moved from the Finger Wharf sheds to Wharf 11, and the number of Marina wet berths shown has been reduced by two thirds, from 636 boats to 212 boats. Dwg: Travis Partners 1985.



Conservation Guidelines for the facades of the Finger Wharf Sheds. From tender documents Supporting Information, August 1986.

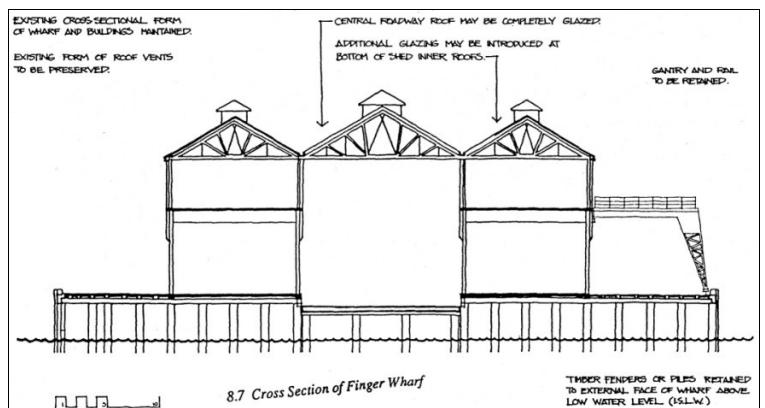
out, with panoramas of the wharf from the top of the new Navy Car Park in the east round to the Botanic Gardens in the west and a rather limited description of the building fabric and architecture. Down at the back in Appendix 4, there is even a Statement of Cultural Significance, with recommendations, produced by Don Godden & Associates, Industrial Archaeologists. I wonder how many people actually saw it.

Meantime, the MSB was preparing the tender documents, and these were published in July with two volumes of 'Supporting Information' following soon after. In terms of heritage conservation, only two of the 12 items in the 'Objectives' section even mentioned the word 'wharves'. These items were: *to establish commercially-viable and productive uses for the wharves, and; to cause income to be generated for restoration, preservation and future maintenance of the wharves.*⁵ As we shall see, these rules were sufficiently vague as to be easily interpreted favourably by tenderers.

Section 4.1, *Constraints (Mandatory) which tenderers shall adhere to* should not have been so easy to overlook. They were almost all about the finger wharf and its wharf sheds, and were quite definite in stating that the pier structure of the Finger Wharf, its building exterior, structure, much of the interior layout and detail and most of the industrial relics *are to be conserved, or are to be retained and restored.*

They went into some detail about the do's and don'ts, and those seemed quite satisfactory at the time to those of us supporting conservation of the wharf. I suppose we thought they were sufficiently strong to address the vagueness of the 'Objectives'.

In the tender Supporting Information, Volume 1 – Planning Guidelines, the Finger Wharf figures briefly in 'Constraints', but is notably absent in the 'Opportunities'. There are a number of photographs and drawings in the Description section of the Guidelines, showing the finger wharf in much detail, inside and



Conservation Guidelines for the facades of the Finger Wharf Sheds. From tender documents Supporting Information, August 1986.

³ From unnamed sources quoted by Engineers Australia magazine in November 1987 and the SMH in September 1988.

⁴ *Woolloomooloo Marina Development Tender Document, July 1986, Part 1.0 Background.*

⁵ *Ibid.*, Part 2.0 Objectives.

Woolloomooloo Finger Wharf

One would think that, by the 1980s, the idea of re-using such majestic industrial structures for many new and exciting projects would have fired the imaginations of the planners and architects involved in tendering, but all they seem to have seen were problems, and dingy, neglected old sheds. It was like the attitudes to the Queen Victoria Building in the 1970s, all over again.⁶ I didn't see these documents until the end of 1986 — I went travelling in July and didn't return until November. My first destination was the United States, then Canada, Europe and the UK, and Singapore.

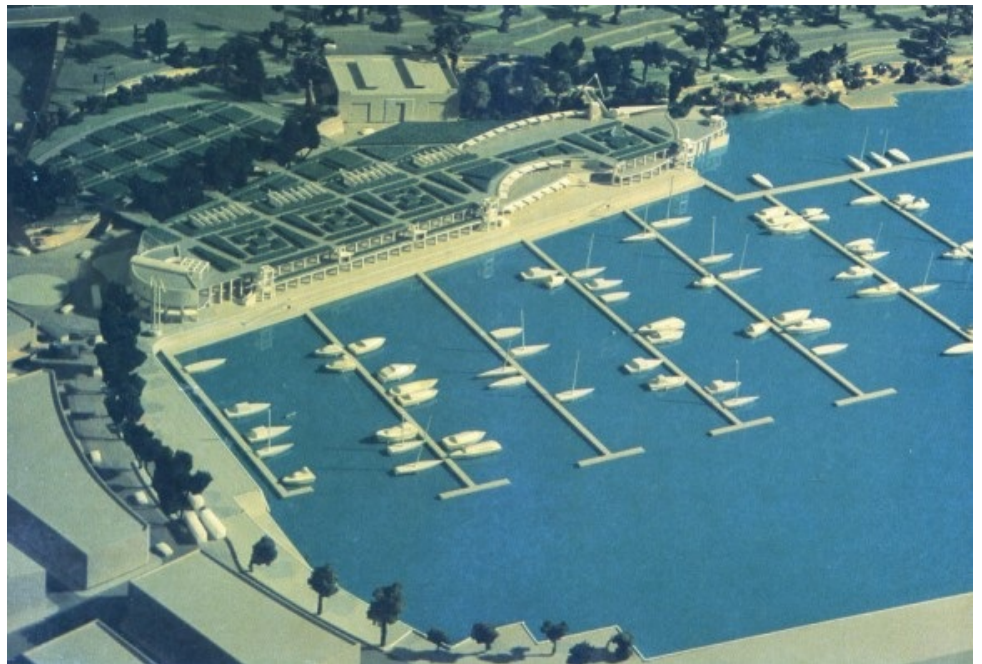


Walsh Bay, around Millers Point, and along Darling Harbour to Pyrmont Wharves, seen from the arch at the top of the Harbour Bridge. Ph: C. Doring, Nov 1990.

The then Director of the NSW Department of Planning (my boss) asked me to visit and report on what was happening – successes and failures – at the redevelopments of historic ports, planned or completed, wherever I could find them: Baltimore Harbour; South Street Seaport in Manhattan; Boston Navy Yard; the Toronto Waterfront in Canada; the Arsenale in Venice; the Thames Docklands in London. There was a lot happening in Sydney's Docklands at the time, with redevelopment underway in Darling Harbour and Walsh Bay and proposed in Woolloomooloo. He was looking for some insights into the importance of industrial heritage to the future of these places. I learned an awful lot, and I think my new knowledge was put to effect through my strengthened ability to advise the Department and the Heritage Council in their decisions on Woolloomooloo in the next year.

Tenders had to be lodged by 7th November 1986, a few days after I returned to work from overseas. I can't remember when the MSB announced the winning tender and I have no cuttings or diary notes for nearly a year after. There must have been some sort of reaction when it emerged that the MSB had favoured a tender that proposed complete demolition of the Finger Wharf, contrary to the former expressed instruction of the Minister that the Finger Wharf be retained. Nevertheless, and despite the fact that a rival tenderer had proposed the rehabilitation and re-use of the finger wharf, the MSB went ahead in May 1987 and entered into a deed of agreement with Woolloomooloo Bay Pty Ltd (a joint venture company whose principal partner was the Pivot Group Ltd) for a development which would involve the demolition of the existing finger wharf. By entering into the deed of agreement, the MSB appeared to support the proposed demolition, but required Woolloomooloo Bay Pty Ltd to prepare an Environmental Impact Statement (EIS), which was duly prepared and went on public exhibition in October and November 1987, with public comment accepted until November 7th. The EIS, prepared by a consultant on behalf of the tenderer, strongly supported the demolish case.

This was where the proverbial hit the fan, with the SMH leading off on the 7th of October with a somewhat caustic article which starts: *The historic finger Wharf at Woolloomooloo is to be demolished to make way for a 440-berth \$63million, marina – if an EIS released today is accepted by the MSB. . . . [The proposal] has also been the subject of a turn-around on the part of the Minister for Public Works, Mr Brereton, who initially announced that Woolloomooloo's "majestic pier" would be "retained and refurbished as the centrepiece of a world-class marina and a variety of retail, office and residential uses".* The SMH also quoted: *A member of the Woolloomooloo Bay Protection Committee . . . said that residents had been deliberately kept out of the consultation process. "The MSB is involved in the development and it will be the Minister for Public Works who makes the decisions on whether the EIS is viable, so you have the proponents also making the decision. This makes the process a farce", she said.* She was by no means the only person who thought similarly, as we shall see.



Part of a model in the EIS Exhibition of the proposed Woolloomooloo Bay Development (it extends further to the right than shown in this photo). Woolloomooloo Bay Development EIS , Oct 1987.

⁶ See my EHA Magazine Editorial, July issue 2016.

Woolloomooloo Finger Wharf

But not the Sydney City Council. In their 17th October submission to the MSB, Council indicated that it was not particularly concerned if the Finger Wharf was demolished. The wharf is the responsibility of the MSB. It is not on land. Council was more concerned with traffic, parking and intersections. However, it was concerned that the 440 berth marina would be just as, if not more unsightly than the wharf. Council would prefer that Woolloomooloo Bay was returned to a 'natural state'. If there had to be a marina, it should be half the size of that proposed. *Combined with the moored navy vessels, and the 440 berth marina, the Bay will resemble a marine parking lot.* I was grateful for that remark, which reverberated in other submissions, and was eminently quotable.

The National Trust, in its blistering condemnation of the EIS, also picked up on the EIS' assertion that demolition of the Finger Wharf would improve the visual qualities of the bay. *The suggestion that an argument can be made in favour of [the Finger Wharf's] removal on the basis that it impedes certain views [of the water] cannot be taken seriously.* The Trust pointed out that the marina would cover much of the bay, and the views from land would: *include a confused and cluttered collection of marine craft, masts and rigging as is the case at Rushcutter's Bay.* . . That comparison appealed to me. I wonder if anyone would go to Rushcutters Bay to look at the water. It is normally almost covered with yachts and cabin cruisers at the marina or at anchor.



An aerial photograph showing the Finger Wharf in its Woolloomooloo Bay context with the city beyond. This photo appears as a frontispiece to the 1987 EIS showing the Bay "at present". It actually dates from some time well before 1987. Possibly 1983 or 1984. Navy Wharves 2,3 & 4 (completed by 1985) are still under construction and a container ship is berthed at Wharf 7.

Woolloomooloo Bay Development EIS, Oct 1987.

I wrote a number of reports: – an Information Report from the Heritage Branch to the Heritage Council; the Heritage Council's submission to the MSB in response to the EIS; the Heritage Council's advice to the Director of the Dept of Planning requesting the Director *to exercise his powers . . . to have the proposal subjected to an examination within the Department* and, after that, the Director's Examination of the EIS. Then there were briefing notes and letters; a report recommending the making of a conservation order. It went on. I still have a few of the original documents, and my handwritten scripts for the typists (back when offices had typing pools!). I like that my texts were copied word for word, even after subjection to examination by the Legal Department, and that my opinions and recommendations were accepted without alteration.

My copy of the Woolloomooloo Bay Development EIS is covered with pencilled comments and strips of paper between pages. Apart from its dismissal of the importance of the heritage of the site, there were dozens of questionable statements in the EIS, from costings to doubtful assumptions. One of those: *Due to the lack of substantial shore based boat maintenance infrastructure (for example, slipways & hardstands), the marina will operate solely as a mooring location. If boat owners wish to service their boats they will have to take them to servicing facilities already established elsewhere in the harbour.* This was an unrealistic assumption.

Woolloomooloo Finger Wharf

A 440 berth marina would likely need small boat storage (dry berths), and preferably sail lofts, chandlery, extensive workshop facilities including cranes or hoists, slipways and hardstand, as well as amenities such as bath and change rooms, kitchen, offices, meeting rooms etc. for boat owners. According to the EIS, none of these would be provided, nor would there be any security from public access to the boats.

I found it quite astonishing that the EIS dismissed all of the Navy's objections to the project, and particularly that of replacing the Finger Wharf with the open ends of the marina structures. The Navy would never be expected to approve the narrow gap left for navy ships to manoeuvre in between the eastern open side of the marina and the navy wharves – a gap which would often be filled with yachts and cabin cruisers going hither and thither and inevitably encroaching on Naval Waters – potential chaos! The EIS response to that objection was: *The Naval Waters Regulations do not generally prohibit the passage of non naval vessels through naval waters.*

I noted that little reference was made in the EIS to local community opinion, despite awareness of community opinion being one of the objectives of the proposed developments. The reason? It was obvious that local opinion was strongly against (even outraged at) the proposals, as evidenced by the huge public rally held at the wharf on Sunday 1 November 1987.



This "Artist's Impression" appears after the frontispiece (see previous page) of the EIS. It is slightly misleading, in that the number of boats shown in the marina is 180 rather than the 440 planned in the EIS, the marina doesn't project as far east as the footprint of the Wharf, and the busy Navy wharves have been turned into a peaceful, tree-lined park.. Woolloomooloo Bay Developments EIS, Oct 1987.

That was not the only public expression of opposition to demolition of the Finger Wharf, and there were a number of other submissions to the MSB opposing the EIS, culminating on 29th November 1987 in an announcement by the Premier, Barrie Unsworth, that he had instructed the Minister for Planning and Environment, Mr Carr, to apply the Heritage Act to retain the Finger Wharf. The SMH of 30th November 1987 reported that the State Government was looking for developers prepared to incorporate the retention of the Finger Wharf into development proposals for Woolloomooloo Bay. I breathed a huge sigh of relief, and the people who led the public opposition rejoiced. But unfortunately that was by no means the end of the dangers to the Finger Wharf.

We had to wait until 17th February 1988 for the announcement of the making of a Permanent Conservation Order (PCO) over the wharf. In the meantime, I had prepared a Conservation Policy Document for the MSB to include as a mandatory part of the tender conditions for the next round of tenders which we assumed would happen. Unusually, the MSB opted to continue negotiations with the previous tenderers, probably because of the Deed of Agreement the MSB had signed with them nearly a year before, and which was to cause mighty problems in the future. It wasn't all over. There were exciting times and the really loud shouting still to come. You will be able to read all about it in Part 3 of this story, to be published in a later issue of this magazine.

A Tourist's exposure to the industrial heritage of Hawaii.

Observing a mixed bag of industrial heritage display & interpretation.

By EHA Past Chair Keith Baker.



Napali coast, Kauai, Hawaii USA. Photo: Keith Baker.

The author spent two weeks in Hawaii in October 2016 visiting four islands, experiencing spectacular natural heritage with scenery including gigantic shield volcanoes and craters, molten lava bubbling and pouring into the sea, spectacular canyons, waterfalls and sea cliffs and surf beaches. Hawaii also has internationally significant modern history with commemoration of the Japanese WW2 attack on Pearl

Harbour and the US historic sites including the USS Arizona memorial. Coincidentally with writing this article, outgoing US President Obama was hosting Japanese Prime Minister Shinzo Abe in the first joint visit to the memorial.



Kilauea Caldera, Volcano National Park, Big Island, Hawaii USA. Photo: KB

Less well known and publicised is the industrial heritage of Hawaii, with a sugar industry dating back 180 years that was a mainstay of the economy, but is now coming to an end. This was most evident to a purposeful tourist on the island of Maui, where I visited a sugar museum, viewed the last remaining sugar mill (over the fence) and saw some novel interpretation on a former sugar plantation now geared to demonstrating a range of tropical crops to tourists. It was also evident that the aging port facilities at Kahului were vastly oversized for their present use of importing motor vehicles and supplies for the locals and hosting cruise ships. Elsewhere there was a hint of industrial heritage at the Royal Kona Coffee Centre on the Big Island, mainly with photos, but there was no coherent story accompanying the assortment of tools and machinery parts displayed.

The sugar mill at Puunene, which dominated the village on the outskirts of Kahului, was still operating in October, but due to close in December.¹ The outlook for conservation of any of the processing machinery was uncertain, but the volunteers at the adjacent sugar museum were hopeful that the museum at least would continue. The previous politically manipulated return on sugar production in such a remote location was no longer economically or environmentally sustainable, but there appeared to be scope for greater production of food for local consumption.

The Alexander & Baldwin Sugar Museum was named after Hawaiian born sons of missionaries, Samuel Alexander and Henry Baldwin. The two started as sugar growers, developed irrigation for the sugar plantations, and became sugar millers. They acquired and expanded the sugar mill (across the road from the Sugar Museum) in 1902, to process the sugar cane from their nearby plantations.



The Puunene Sugar Mill at Maui, Hawaii, USA. Photo: KB

The museum covered the local history of the development of plantations in Maui, with emphasis on Alexander's and Baldwin's roles, including the development of the East Maui Irrigation Scheme from 1876. This irrigation scheme has since been recognised as a National Civil Engineering Landmark by the ASCE.² Labour for the plantations was provided over the years by waves of indentured immigrants from Japan, Korea and the Philippines who were encouraged to remain separate for industrial reasons but gradually merged with the Hawaiian and European population to produce today's multi-cultural society. The museum also acknowledged Californian entrepreneur Claus Spreckels (who became Maui's sugar baron), and who operated a competing mill and established a transport network to the Kahului port. There were historical displays and photos inside the museum as well as a collection of plantation machinery outdoors. A video of the operation of the mill in 2002 was on display while a film of the museum can be viewed on their website.³



A small "Cuban" Mill, used for crushing samples of sugar cane for testing the juice to see whether the cane was ready for harvesting. Photo: KB.

1 From the Maui News of 22nd January 2017, a story about how the closure of the sugar mill affects the Sugar Museum across the road: <http://www.mauinews.com/news/local-news/2017/01/sugar-museum-is-grieving-the-loss-of-a-friend/>

2 See <http://www.asce.org/project/east-maui-irrigation-system/>

3 See the Honolulu Star-Bulletin re the development of the Sugar Museum at: <http://archives.starbulletin.com/2002/07/21/travel/tsutsumi.html>

A Tourist's exposure to the industrial heritage of Hawaii.



The Dargie Model Sugar Mill at the Alexander & Baldwin Sugar Museum. Photo: Keith Baker

"The Dargie Model Sugar Mill is a scale model (3/4 inch = 1 foot) of a nine-roller mill designed and built by Honolulu Iron Works in 1918. The working model on display at the museum shows how sugar cane was crushed in Hawaii from the late 1800s until the 1980s." The Maui News, 22/01/2017.



"Floating" gears from a former sugar mill in a pond at the Maui Tropical Plantation. Photo: KB.



The Claus steam locomotive displayed inside the Mill House Restaurant at Maui Tropical Plantation. Photo: KB.



Rear view of Claus.

Photo: KB.

However, inside the Mill House Restaurant beyond the factory pipes is a heritage gem, the fully restored Claus Spreckels Steam Locomotive built by the Baldwin Locomotive Factory in 1882 in Philadelphia, with details provided. It was named Claus Spreckels after the island's sugar baron, but was later known simply as Claus.

The loco was taken out of service in 1932 and later donated to Bishop Museum in Honolulu where it was displayed outdoors. After suffering some deterioration it was returned to Maui in 1985 to the A&B Sugar Museum where it was restored. Claus was subsequently loaned to the Tropical Plantation for display, along with the only remaining 1882 Kalakaua Coach Car.⁴

⁴ See explanations about the Claus locomotive and the Kalakaua Coach Car at: <http://mauitropicalplantation.com/train>

A Tourist's exposure to the industrial heritage of Hawaii.



Duke Monument on Waikiki Beach. Photo: KB.

Leaving aside the sugar industry and 19th century transport, we then move forward to 1912 to a feature for which Hawaii is more famous: surfing and its ambassador Duke Kahanamoku whose statue is on Waikiki Beach, Honolulu. Surfing had been a recreational pursuit of Hawaiians from early times using long solid wooden boards. Duke, who was an Olympic champion swimmer, introduced surfing to the rest of the world. Since then there has been steady improvement in the industrial design and construction of surf boards in Hawaii and elsewhere, but I am probably the least qualified person to tell that story.



Plenty of surf boards, but no surf, Waikiki Beach, Hawaii. Photo: KB.

Moving forward again to 1941 we visit Pearl Harbour, where more than half of the US Pacific Fleet stationed near Honolulu was attacked by the Japanese air and naval forces, drawing the US into World War 2. Pearl Harbour is now a vast historical site featuring the memorial to those lost in the USS Arizona, and built over the sunken wreck of the that battleship.



Base of a gun turret on the USS 'Arizona', viewed from the Arizona Memorial. Photo: KB

USS Arizona
From Wikipedia
During the Japanese attack on Pearl Harbor on 7th December 1941, Arizona was bombed. After a bomb detonated in a powder magazine, the battleship exploded violently and sank, with the loss of 1,177 officers and crewmen. Unlike many of the other ships sunk or damaged that day, Arizona was irreparably damaged by the force of the magazine explosion, though the Navy removed parts of the ship for reuse. The wreck still lies at the bottom of Pearl Harbor and the USS Arizona Memorial, dedicated on 30 May 1962 to all those who died during the attack, straddles the ship's hull.



Aerial view of the Arizona Memorial, the shadow of the 'Arizona' under water and the gun turret as photographed at left. Photo: US Navy.

There is also opportunity for visitors to go on board USS Missouri and the submarine Bowfin as well as museums and indoor and outdoor displays. As expected, and as an official US Government visitors' centre and memorial, the displays were very well presented and respectfully interpreted, reflecting the honour in which US armed services personnel are held. In parallel with this display of respect for lives lost is a display of 1940s and subsequent US military technology and industrial capability.

The visit to Hawaii was not primarily to see engineering heritage, but amidst the natural beauty and opportunity for a relaxed holiday with my wife and friends, such industrial heritage gave some context to the social makeup of Hawaii. The State Capital, Honolulu, is well served by the Bishop Museum for its ethnographic and natural history, but one can only hope that as the formerly major sugar industry draws to a close, more is done to conserve its heritage and inform its custodians and visitors.



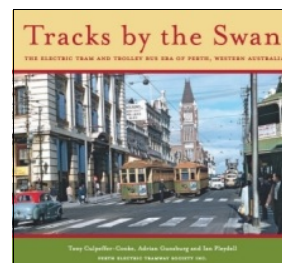
The USS Missouri berthed at Pearl Harbour as part of the Hawaii Maritime Museums. Ph: KB

The Missouri is known as the US Navy's last battleship. She was commissioned in 1944 and so missed the Pearl Harbour attacks, but she was at Iwo Jima & Okinawa, and was the site of the signing of the WW2 Japanese Instrument of Surrender. After serving in the Korean War she was retired in 1955 & re-commissioned in 1986, whereupon she made a "State Visit" to Sydney. She returned to Australia several times before retiring to Pearl Harbour in 1998.

Connections

Book on Trams in Western Australia

If you read the story about Trams in Australia in the October 2016 EHA Magazine, you may have noticed there were only a few words about trams in Perth WA – just that *Plans to reintroduce electric trams in Perth . . . have also been promulgated.* A reader wrote to tell me of the gap, and drew my attention to *the beautifully produced and well illustrated book by Tony Culpepper-Cooke, Adrian Gunzburg and Ian Pleydell entitled 'Tracks by the Swan', published by the Perth Electric Tramway Society Inc in 2010. This book of some 300 pages tells the story of the electric tram and trolley bus era of Perth.* If you would like to buy a copy, an order form for *Tracks by the Swan* can be found at the website of the Perth Electric Tramway Society at: www.pets.org.au It has information on all four of the former WA electric tramway systems (Perth, Fremantle, Kalgoorlie & Leonora).



Lithgow Small Arms Factory Documentary

A friend sent us a link to a video documentary about the Lithgow Small Arms Factory. The video was made at the Small Arms Factory Museum and the script is spoken by Museum Volunteer Brian Maloney.

Find it at: <https://www.youtube.com/embed/HqP3jNReCQg?rel=0>

You can go to the Museum website at: <http://www.lithgowsafmuseum.org.au/> for more information and lists of books that can be purchased.



Postcard images of the Ford Factory in 1917

Harry Trueman sent around a pdf file of postcards issued by the Ford Motor Company in the USA back in 1917. I thought I would track it down to its source, and found two websites on which it can be found. The best one is the United Auto Workers [Union] Local 1970 (Ford Salaried Workers) website, which also tells you: *This PDF was submitted by Don Filiak, retiree. Thank you for the info! Henry [Ford] had on-site schools, teaching the workers to speak English, as well as hospitals, and other facilities. The pdf is of an accordion style format postcard with 22 photos depicting factory scenes at Ford Motor Company from 1917. Great rare photo images of the historic Ford Highland Park Plant [in Detroit Michigan]. At this plant Henry Ford introduced industrial innovations such as crane lifting materials in the central atrium to the upper floors, from where parts would slide or be crane dropped to lower floors for progressive operations . . . and where Ford and his team introduced the auto assembly line. Of the seven huge electrical generators Ford had constructed there, one was eventually moved by rail and installed at the Henry Ford Museum for all to see evermore. The name of the PDF file is (Ford_Plant_Postcards_Circa_19172-rfh1.pdf) Find it at : <http://region1a.uaw.org/local1970/index.cfm?action=article&articleID=09507744-966E-47EC-A8D4-1D74CB5F6C47>*



Valley Heights Steam Tram Rolling Stock

Here's another one for tram aficionados. Relics of the steam tram system in NSW are almost as rare as hen's teeth, so it is good to see a few items of original Sydney steam tram rolling stock still in captivity at Valley Heights in the Blue Mountains, and last year added to the NSW Heritage Register as a collection of movable heritage items. The description and citation on the Register can be found at:

<http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5062526>

Want more information? Go to: Valley Heights Locomotive Depot Heritage Museum on Blue Mountains Australia.com at: <http://infoblue mountains.net.au/locodepot/>



Engineering Heritage papers in EA Technical Journals

Last December, Engineers Australia told us that EA now publishes their technical journals through their partnership with Taylor & Francis, a global publisher of scholarly journals. If you go to:

<https://www.engineersaustralia.org.au/resources-and-library/engineers-australia-technical-journals> the page shows links to seven different journals – Civil, Electric & Electronics, Engineering Education, Mechanical, Structural, Water Resources, and Multi-disciplinary Engineering, the last of which includes Engineering Heritage. You can go directly to the Multi-disciplinary Engineering journals at: <http://www.tandfonline.com/loi/tmul20#.V0OyqoXo9bk> These start at Volume 1 for 2003 and go to Vol.12 for 2016. To save you time, the journals with Engineering Heritage papers are in Volumes 2, 3, 4, 6(part 1), 7(part 2), 8(part 1), 9(part 1) plus 1 paper in Volume 12.



